‘Good’ is Better than ‘Best’:
Strategic Decisions with Uncertain Scientific Models

§ The problems of uncertainty:
• Design or decide.  • Robustness to noise and info-gaps.  • Opportuneness: exploit windfall.
• Satisfice or optimize.

§ Information-gap uncertainty:
• Uncertainty is a limitation of knowledge.
• Uncertainty is a gap between what is known and what could be known.
• Surprises and ignorance.

§ Models:  • Characterize reality.  • Attributes of model correspond to attributes of reality.

§ Model-based decision: adapt decision to attributes of model.

§ Optimal model-based decision: Use best model to choose decision with best outcome.

§ Fallacy of optimal model-based decision:
• Severe uncertainty:
  ◦ Best model errs seriously.
  ◦ Some model attributes are correct.
  ◦ Some model attributes err greatly.
• Best-model optimization:
  ◦ Exploits all model attributes to the extreme.
  ◦ Vulnerable to model error.

§ Resolution: robust-satisficing
• Trade performance for robustness.
• Satisfice performance.  • Optimize robustness to uncertainty.

§ Robust-satisficing syllogism:
• Adequate performance must be attained.
• High reliability of adequate performance preferred over Low reliability of optimal performance.
• Max reliability of adequate performance is best.

§ Trade-off:  • Robustness vs. performance.  • Pareto efficiency.

§ Preference reversal: crossing of robustness curves.

References: